POTENTIAL USES OF FARM PRODUCTS AS AID TO DEVELOPING COUNTRIES 1/

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I

It is our purpose in this paper first, to refine the concept of the world food deficit by distinguishing between nutritional deficits and economic deficits. Second, we will classify the developing countries into two groups based on current growth rates, and then estimate future food needs for each grouping separately. Third, we will project food availabilities in each group of countries from domestic production and commercial imports and relate those food availabilities to requirements. Finally, we will attempt to develop a strategy for meeting the remaining deficits through food aid.

The concept of a nutritional deficit employed here is the familiar one used by USDA in the World Food Budget; i.e., a shortage of available calories and protein per capita to meet minimum physiological requirements for the maintenance of health and normal activities. 3/ With rapid economic growth the demand for food, over and above minimum nutritional requirements, exceeds prospective supplies in many developing countries. This tendency for food demand to outrace supplies during the early stages of economic growth, we define as an economic deficit -- a deficit which must be

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2/ Director of Agricultural Economics, International Agricultural Economist, and Staff Economist, of the USDA, respectively.
3/ The World Food Budget - 1962 and 1966, Foreign Agricultural Economic Report No. 4, USDA, Washington, D. C., 1961.

met if these countries are to experience sustained growth at a rate commensurate with their potential and their aspirations.

The underdeveloped world is classified into two groups in this paper: (1) a group that is presently experiencing little or no economic development, and (2) a group that appears to have entered a period of significant and sustained economic growth. Future food needs for both groups of countries are projected upon commonly accepted estimates of income elasticities of demand and population growth. And we assume expanded programs of technical assistance on the production side, which permit our projections of domestic food production to increase significantly in the next two decades.

Fundamental to the analysis in this paper is the recognition that food production is critical to the growth process, and is limiting in its effect on the rate of economic growth in the developing countries. Today, there is a growing awareness of the role of agricultural production and food supplies in economic growth. 4/ The key role of food and agriculture is described in the recent USDA publication, "Agriculture and Economic Growth." 5/ In this paper we will try to carry previous analyses a few steps forward by disaggregating the total deficit problem and analyzing rates of production, trade and aid required to achieve an acceptable rate of economic growth in different developmental situations.

4/ See the paper of the Senior Author entitled "The World Food Budget: A Forward Look to 2000 and Beyond," WORLD FOOD FORUM PROCEEDINGS, USDA, Washington, D. C., 1962, pp. 86-96. Also various papers presented at the 1963 World Food Congress.

5/ Agriculture and Economic Growth, Agricultural Economics Report No. 28, ERS, USDA, Washington, 1963.

II

The magnitude of the total current world food deficit is well known. In 1961, the USDA estimated that it would require 1.1 billion bushels of wheat, 7.0 billion pounds of vegetable oils, 3.5 million bags of dry edible beans and 3.3 billion pounds of non-fat dry milk to bring the world food budget into balance. In 1962, we converted these quantities to dollar values of food at the farm level and made projections to the year 2000 and beyond. The results of that study showed that under rapid economic growth conditions the food deficit in developing countries would increase to about $27 billion in total by 1980. 6/

According to the Third World Food Survey made by the Food and Agriculture Organization, 10 to 15 percent of the world's population is undernourished, and up to 50 percent suffer from malnutrition. 7/ The FAO projects per capita incomes to increase at three percent per year through 1975, and estimates the income elasticity of demand to be 0.7. Under these conditions, the total food supply in developing countries would have to increase at an annual rate of 3.5 percent, animal foods by 4.8 percent and cereals by 2.04 percent to bring about a balance between requirements and supplies (see Table 1).

6/ See first reference cited in footnote 4.
7/ Third World Food Survey, Basic Study No. 11, FAO, Rome, 1963, pp. 43, 51.

If we take a less aggregative view of the world deficit problem and examine food needs by regions for major groups of products as shown in Table 1, we find that the Far East presents the largest challenge in terms of current and projected food needs. In 1960, this region had about three-fourths of the population of the underdeveloped world. Under the above economic growth assumption, the projected demand for total food, as well as animal protein foods, would expand faster in the Far East than in other regions. Both the population and income effects on total demand are greatest in this region. 8/ On the other hand, the FAO expects that the largest growth in demand for cereals will be in West and Central Africa and in the northern and western countries of South America.

The foregoing should demonstrate that developing countries are not homogeneous in their food deficit problems. Growth in the demand for food, as well as the ability of a country to meet this demand either by its own agricultural production or from international trade, varies from country to country. Generally, however, the nature of both the demand and supply of food can be meaningfully related to the stage of economic growth. For example, in countries well below the take-off stage in economic development, growth in per capita incomes and agricultural production is very slow. Food production increases slowly in these countries because of the lack of capital, low educational levels and a slow adoption of improved production

8/ For an illustration of the income and population effects on total demand for food see: Agricultural Commodities -- Projections for 1970, FAO, Rome, 1962, Appendix A, Tables M-5 and M-6.

technologies. Increases in total demand for food are primarily a function of population growth. But, since population growth is often rapid, food requirements increase faster than food supplies. Under such conditions, the nature of the food deficit in these countries is primarily nutritional.

On the other hand, countries experiencing a moderate to fast rate of growth in per capita incomes and agricultural production may have a food deficit problem that is both nutritional and economic. 9/ It is nutritional if the available supply of calories and proteins is inadequate when related to a minimum nutritional standard. It is economic when rapidly rising income per capita increases the total demand for food more rapidly than the supply of food. And ironically, once the take-off stage is passed, the economic food deficit has a tendency to widen with rapid and sustained economic growth.

Although different economic and social conditions in individual countries give rise to numerous variations in food deficit problems and frustrate generalizations regarding their solutions, we have attempted a delineation of the deficit problems in underdeveloped countries with respect to economic growth conditions. These results are presented in Table 2. The data in Table 2 represent 93 countries and account for about 99 percent of the world's population, agricultural production and income. We have divided the world into three groups: (1) developing countries with slow or no economic growth, (2) developing countries with moderate to rapid economic growth and (3) developed countries.

9/ Again, a nutritional deficit is simply a food shortage relative to a dietary standard. An economic deficit is a measure of the potential imbalance in demand and supply of food at prospective rates of economic development -- and thereby, in many situations a measure of additional food supplies necessary for growth.

The first group of countries is characterized by a high proportion of the gross national product originating in agriculture, a high rate of population growth and a slow rate of growth in both per capita incomes and agricultural production. The second group of countries, on the other hand, has a lower proportion of GNP derived from agriculture, a somewhat slower, but still rapid population growth, and moderate to fast rates of growth in per capita incomes and agricultural production. The third group includes the developed countries which are primarily industrialized economies; these have a slow rate of population growth, but relatively rapid growth rates in per capita incomes and agricultural production.

An analysis of the world food situation by 1980 for these country groupings shows that the potential food deficit will increase to a dollar value of $4.5 billion for the first group and to $21.1 billion for the second group--an increase of nearly four-fold and ten-fold, respectively (see Table 3). The larger income effect in the medium to rapid growth countries (2.1 versus 1.1 percent) results in a faster growth in demand (4.3 versus 3.5 percent) even though the population effect is smaller than for the slow growth countries. Thus, the rate of economic growth has an important effect on the rate of expansion in the total demand for food. And, as we shall see in the next section, the rate of economic growth directly affects the projected imbalance between the demand and supply for food in the two groups of countries. In contrast, without adequate supply controls or sharply lower prices, food surpluses in developed countries could increase from $1.4 billion to $36.1 billion by 1980 (see Table 3).

The meaning of this analysis is clear. If the food deficits in the developing countries are to be met over the next two decades, there will have to be great increases in domestic production, as well as great increases in the transfer of food from surplus areas to the underdeveloped countries, through both increased trade and aid. But how much of these deficits can be met by increased domestic food production and how much by commercial trade? An examination of these prospects is a prerequisite to the determination of the potential use of food as aid to the developing countries.

III

In the analysis of food needs for the medium to rapid growth group, we have assumed that population and national income will increase at the 1953-60 rate of 2.2 and 5.3 percent, respectively, for the next two decades (see Table 3). Food production per capita is projected to increase at 1.1 percent, compared with 0.7 percent during 1953-60. Under these growth conditions, and an assumed income elasticity of demand for food of 0.7, the total demand for food increases at an annual rate of 4.3 percent. At these rates, the demand for food exceeds food production by $21.1 billion by 1980 for this medium to rapid growth group. The projected rate of increase in food production is, however, sufficient to more than meet minimum nutritional standards. 10/ Thus, the food deficit for this grouping as of 1980 is entirely economic. It is a real deficit, however, in that if it is not met the rate of economic growth assumed here

10/ Per capita food production would exceed the minimum standard used in The World Food Budget even before 1970.

would not be realized. Rapid economic growth in the developing countries implies the availability of vastly larger supplies of food in those countries than present production plans call for; this is the important story of this paper.

The total food deficit for the slow growth countries, on the other hand, would increase to only $4.5 billion by 1980. Here again we have projected population growth at the 1953-60 rate, but have optimistically projected food production and income growth at slightly higher rates than in the past. With a projected annual rate of increase in per capita food production of 0.6 percent, food supplies from domestic production would be just about adequate to meet the minimum nutritional standards for these countries by 1975. 11/ And by 1980 with continued growth, a relatively small economic deficit of $4.5 billion opens up.

The implications of this analysis are: (1) if economic growth is achieved in the underdeveloped countries primarily through industrial growth with little or no increase in agricultural production, then the demand for food will outpace food supplies and create a tremendous food deficit problem; and (2) if agricultural production increases at about one-half the rate of industrial growth,

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11/ Food production per capita in these countries as of 1960 was $33; food consumption per capita of $36, or an increased supply of $3 per capita, would have met the minimum nutritional standard. The projected rate of growth of 0.6 percent in per capita food production would enable these countries to meet this minimum around 1975.

food supplies should be adequate to meet the caloric or nutritional deficits, but still will not be adequate to meet the rapidly growing economic deficit. In other words, rapid economic growth in the developing countries is not likely to solve the food deficit problem; it will solve the nutritional part of it, but in fact it is likely to contribute to a further widening of food deficits as the force of a high income elasticity expands food demand rapidly.

Now the question arises -- how much of the deficit can be met through increased commercial trade? For the underdeveloped countries as a group, imports of all commodities have increased about 12 percent for each 10 percent increase in income since 1938. 12/ During this time, agricultural imports have increased at about the same rate as growth in income; that is, the elasticity of agricultural imports per capita associated with changes in incomes was 1.09. If we assume that this relationship between growth in per capita incomes and agricultural imports will also hold through 1980, then food imports would increase by $8.8 billion in the rapidly developing countries, and by $2.1 billion in the slowly developing countries (see Table 4).

12/ Arthur B. Mackie, unpublished manuscript on Foreign Economic Development and the Demand for U.S. Farm Products, USDA, 1963.

Thus, $8.8 billion of the $21.1 billion food deficit could possibly be met by commercial food imports into the rapidly developing countries. Such a level of imports would still, however, leave an estimated food deficit of $12.3 billion that must be met by foreign food aid if continued economic growth is to be achieved in these countries. The comparable value of the unmet food deficit for the slowly developing countries is $2.4 billion. The combined value of these food deficits amounts to $14.7 billion, or about 10 times larger than the current U.S. food aid program.

The conclusions to be drawn from the above analysis are: (1) that increased domestic food production -- i.e., increased production above the historical 1953-60 rate -- would meet only about 55 percent of the projected food deficits, or $32 billion out of the total of $58 billion (see Table 4); (2) that increased commercial imports, associated with increased income and food production, would meet about 42 percent of the remaining $25.6 billion deficit; and (3) that increased food aid programs would be required to meet the remaining $14.7 billion food deficit. Thus, this residual share of the world food deficit as of 1980 suggests a major role for food aid programs in the future growth of these developing countries.

The magnitude of future food aid programs needed will depend, of course, upon the extent of economic growth achieved in these countries, but this in turn, as we have seen, will depend upon the extent of future food aid programs. Potential food needs -- total volumes and kinds of commodities -- vary greatly among the underdeveloped countries. Consequently, the role of food aid in the promotion of economic growth in the developing countries must vary with the specific situation. Implied in this concept of food aid is a strategy to meet particular economic conditions rather than the pursuit of a general overall plan or program. Let us therefore consider food aid strategy for the two groups of developing countries.

IV

For the slow growth countries, an appropriate strategy of food aid should take as a major objective the elimination of nutritional deficits as soon as possible. At this time, there are apparently critical factors other than food supply that are limiting economic growth in these countries. We all recognize that inadequate education, technical and administrative skills, and financial and commercial institutions serve to dampen the development process. And this lack must be overcome, if balanced growth is to be achieved. But the elimination of nutritional deficits over the next decade can do much to bring these countries to the "take-off" stage of economic growth.

The above objective is attainable. It would require no major change in the types of food aid involved -- only a moderate intensification of such programs. Since currently the growth potential in these countries is not large, there is little opportunity for an expansion of food aid through sales in the market place for either foreign currencies or long-term credit in hard currencies (Titles I and IV of P.L. 480). But a sustained effort to increase domestic food production, and to expand food aid through direct distribution, school lunch programs, and work projects promises to meet minimum nutritional needs in these countries prior to 1980.

There are, however, serious distributional bottlenecks that must be broken in order to attain the necessary expansion of direct food aid. These bottlenecks are real and of varying degrees of magnitude in different countries. But, in the main, they consist of (1) inadequate marketing facilities for the handling and storing of increased amounts of food, and (2) the lack of qualified personnel to supervise the distribution and use of food aid.

Nevertheless, a growing awareness of these problems is occurring as a result of greater experience with food aid programs and efforts such as the Freedom from Hunger campaign of the FAO. Thus, it now appears that private agencies, national governments and international agencies can be marshalled to meet the nutritional deficit problems of these slow growth countries within the next 10 to 15 years.

In the rapidly growing countries, we can look ahead to a period in the very near future when nutritional deficits will have been met. The major objective of food aid in these countries thus must be the more difficult task of sustaining the present rate of economic development. If this is done, the nutritional problem can be rather easily met by increased domestic production of food and/or commercial imports. However, if our estimates of the income elasticity of demand for food are approximately correct, the demand for food in these countries will be greatly in excess of prospective domestic production in the late 1960's and 1970's.

The strategy of food aid in these countries should be to prepare for a rapid expansion of food aid mainly through quasi-commercial channels -- for example, Titles I and IV of P.L. 480. In addition, relatively low international prices for temperate zone food products would assist the needed expansion of commercial imports. But in fairness to countries that are major exporters of temperate zone food products, low prices should apply only to the imports of developing nations with higher prices applicable to the trade among developed countries. Such an organization of international trade might be accomplished by means of international commodity agreements.

The growing ability of this group of countries to compete in international trade and the types of food aid appropriate for them, will continue to present serious problems of interference with normal patterns of commercial trade. These problems can be minimized if (1) food aid programs -- bilateral and multilateral -- are carefully drawn to avoid where possible the substitution of food aid for commercial sales, and (2) developed countries can accept a long-range view of interference with usual marketings. Recent research indicates the virtual impossibility of preventing some displacement of short run commercial sales through food aid for economic development. But this research also clearly demonstrates that in the long run, economic development in these countries will greatly increase commercial imports of food from the U.S. and other developed nations. 13/

The elasticity of demand for livestock products in the rapidly growing countries is high. Under these conditions, increased shipment of animal products under food aid programs would help to meet existing deficits. Food aid of this type would however, be an inefficient way to meet the rapidly growing economic deficit for these items. Thus, a major reorientation of food aid for these countries should take the form of increased programming of feed grains to allow these countries to increase their own production of animal products. In most cases, food aid in the form of feed grains would need to be accompanied by a vastly expanded program of technical assistance in livestock production. Without such a program of technical assistance, much of this kind of food aid would be wasted.

13/ F. Ginor, Analysis and Assessment of the Economic Effect of the U.S. Public Law 480, Title I Program in Israel, Bank of Israel, Tel Aviv, Israel, Oct. 1961. See also the reference cited in footnote 12/.

Other specific opportunities for food aid in rapidly developing countries include: (1) the building up of national food stocks to meet variations in demands, (2) the control of inflation so that the degree of price stability needed for orderly planning in production and capital investment may be achieved, (3) the encouragement of domestic savings through price stability and the conservation of scarce foreign exchange earnings to reduce the need for a continued high level of food imports, and (4) the creation of social overhead capital through the use of food as a wage good for labor used to build schools, marketing facilities dams and irrigation projects -- all of which add to the long-run productive capacity of the economy.

In short, the real needs for food aid in rapidly developing countries are two-fold. The first, and most often emphasized, is the need to control inflation so that all the benefits associated with price stability can be captured. These benefits of increased savings, capital investments, production, consumption and rising real incomes are the essential elements of the growth process. The second, is to increase the domestic production of agricultural products so that the major contributions of agriculture to general economic growth can be realized. The use of food aid to maximize these benefits requires a coordinated but flexible program involving constant experimentation and program evaluation to determine the optimum balance between aid programs emphasizing food supply and food production, and aid programs emphasizing industrial development.

Clearly, the expansion of food aid programs must be based on the objective of promoting economic development -- not as a surplus disposal program in a narrow sense. But the fact that several developed countries now have excess productive capacity in agriculture, and that the developed countries as a group could be running an aggregate food surplus amounting to $36 billion in 1980, is both fortunate and significant. In a general sense there is a strong likelihood that sufficient excess agricultural productive capacity will be in existence in 1980 among the developed countries to more than meet the expected world food deficit (see Table 3).

V

So far our analysis has indicated that the projected food deficits in developing countries can be met with increased domestic production, commercial trade and food aid. In other words, expected overall food production in the world appears to be adequate to meet projected world food needs. But there remains the problem of determining the specific means and methods of financing, storing, handling, and distributing food products to overcome the many obstacles and bottlenecks that will be encountered in the transfer of food of the magnitudes projected for 1980.

A mere expansion of existing food aid programs will not overcome the present handling and distribution bottlenecks to the effective utilization of that food aid. New methods and arrangements are needed to carry out enlarged food aid programs first to reach, or crack, the nutritional deficits in the slow growing areas and second, to cope with the economic deficits where development is rapid. And the development of these programs must not impinge upon the normal expansion of commercial trade and other forces sustaining economic growth in underdeveloped countries.

For example, the cost of food in increased food aid programs is by no means the only cost involved. Even if the developed countries bear the total cost of the food provided, and deliver it to the underdeveloped countries free of charge, its effective utilization still depends upon the removal of important distribution bottlenecks in those countries. Necessary marketing, storage, and distribution facilities can be financed only in part by the developing countries. Thus, the donation of food by developed countries may be of limited use if they do not invest still further in programs and facilities to insure the effective distribution and utilization of that food. And the lack of adequately trained civil service personnel to administer and supervise the orderly distribution of food commodities currently prohibits a major expansion of food aid programs in some developing countries.

Recently, the USDA has expanded its research in foreign economic development to determine the casual forces in agricultural development in the developing countries. The purpose of this work is to provide a basis for the Agency for International Development to improve its programs of technical assistance in agriculture. The results of this research should prove useful in tailoring future food aid efforts to the needs and opportunities for agricultural improvement.

But additional research is needed to determine: (1) what marketing facilities are most urgently needed, (2) what institutional and administration changes are required to break existing bottlenecks to effective food distribution, (3) what food products can be used most effectively, given the developmental situation in a country, (4) what are the desired combination or mix of food aid with financial and technical assistance, and (5) what procedures are needed for financing development efforts consistent with partnership arrangements.

But research does not move or distribute food. New, revised and improved action programs must follow such research. On the basis of such research, however:

1. The recipient countries will understand better what they are up against.

2. The donor countries will know what additional costs must be associated with food aid -- if that food aid is to be productive.
3. These ideas can be spelled out in contracts indicating:
   a. The use of foreign aid funds,
   b. The use of counterpart funds,
   c. The use of the financial resources of the recipient countries.

We cannot do this in one short paper. We do not have the knowledge, and we don't have the time or space even if we had the knowledge. This will be a continuing task for the next two decades as a very minimum.

But what must be recognized is that we are nearing the end of easily formulated food aid programs based purely on hunger. We are entering a more difficult phase where food aid can contribute greatly to economic growth, or it can create serious problems based on ill-conceived programs. We are entering the stage where food aid must be phased into development programs, large and small. If that phasing-in process is well done, the development processes will be sustained and augmented. If not, trade disruptions, growth interruptions, and scandalous waste can be the result.

Table 1. Effects of population and income growth on the demand for food in developing countries, 1975

Region	Population effect	Income effect			Total demand		
		Cereals	Animal food	Total food	Cereals	Animal food	Total food
	Annual growth rate to 1975, percent compounded						
Far East	2.00	0.00	2.97	1.62	2.00	4.97	3.62
South Asia	2.00	0.00	3.68	1.97	2.00	5.68	3.97
Southeastern Asia, Mainland	2.13	0.00	1.18	1.11	2.13	3.31	3.24
Eastern Asia	1.51	-0.19	1.80	.91	1.32	3.31	2.42
Southeastern Asia, Major islands	.82	0.60	2.90	1.55	1.45	3.73	2.40
China, mainland	2.08	0.00	3.20	1.67	2.08	5.28	3.75
Near East	2.13	-0.62	2.40	.93	1.51	4.52	3.06
Africa	1.69	0.64	3.25	1.26	2.33	4.94	2.95
North	2.37	-0.29	2.15	.94	2.08	4.52	3.31
West and Central	1.60	1.57	5.69	1.28	3.17	7.29	2.88
East and Southern	1.74	-0.14	1.29	.79	1.60	3.03	2.53
Latin America (excl. Argentina and Uruguay)	2.61	0.70	1.49	.80	3.31	4.10	3.41
Mexico & Central America	2.69	0.34	1.44	.72	3.03	4.13	3.41
Northern and Western countries of South America	2.45	2.18	1.30	.90	4.63	3.75	3.35
Brazil	2.76	0.00	1.70	.69	2.76	4.46	3.45
Total, low-calorie countries	2.04	0.00	2.73	1.44	2.04	4.77	3.48

Source: Food and Agriculture Organization, Third World Food Survey, Basic Study No. 11, Rome, 1963.

Note: The above data were computed from the data given in Appendix 8. It should be pointed out here that the zero and negative income effects for cereals result from an arbitrary setting of food targets "to allow for the additional consumption of food stuffs from animal sources needed to meet the animal protein targets." See page 60 of the above report. For a discussion of the effects of population and income growth on total demand for food see: Agricultural Commodities - Projections for 1970, FAO, Rome, 1962 Appendix A.

Table 2 - Economic Growth Conditions in 93 Countries, 1953-1960

Type of Economic Growth	Number of countries	Average income per capita, 1960	Annual rate of growth, percent compounded, 1953-60			Population 1960	Calorie intake as a percent of requirement, 1960	Farm share of GNP
			Per capita incomes	Agri. production per capita	Total population			
	Number	U.S. Dollars	Percent	Percent	Percent	Billion	Percent	Percent range
Developing countries:								
Slow growth countires 1/	32	100	1.0	.4	2.4	.6	93	25-73
Medium to rapid growth countries 2/	31	93	3.0	.7	2.2	1.5	91	6-63
Developed countries 3/	30	1,000	4.1	1.6	.9	.9	over 100	4-32
World 4/	93	367	2.8	1.0	1.9	3.0	100	4-73

1/ Includes: Afghanistan, Angola, Belgium Congo, Brazil, Cambodia, Cameroun, Ceylon, Colombia, Cuba, El Salvador, Ethiopia, French Equatorial Africa, French West Africa, Guatemala, Guinea, Haiti, Indonesia, Iran, Liberia, Laos, Libya, Malaya, Morroco, Pakistan, Philippines, South Korea, Sudan, Syria, Togo, Tunisia, Turkey, and Uganda. (Annual rate of growth of per capita incomes was less than two percent for all of these countries.)

2/ Includes: Algeria, Argentina, Bolivia, Burma, Chile, China Mainland, China (Taiwan), Costa Rica, Dominican Republic, Egypt, Ecuador, Ghana, Honduras, India, Iraq, Israel, Jordan, Kenya, Lebanon, Mexico, Nicaragua, Nigeria, Panama, Paraguay, Peru, Rhodesia and Nyasaland, Tanganyika, Thailand, Uruguay, Venezuela, and Vietnam (South). (Annual rate of growth of per capita incomes was two percent or more in all of these countries.)

3/ Includes: North America, Australia, New Zealand, Japan, South Africa, and Europe including USSR.

4/ These 93 countries account for about 99 percent of the world's population, agricultural production and income.

Table 3 - The World Food Situation: 1960 and 1980

Item	Unit	Developed countries		Developing countries			
				Medium to rapid growth		Slow growth	
		1960	1980	1960	1980	1960	1980
Population	Billion	.9	1.08	1.5	2.32	.6	.96
Growth rate 1/	Percent	1.0		2.2		2.4	
National income	Bil. dols.	900	1950	140	390	60	130
Growth rate 1/	Percent	4.0		5.3		3.9	
Income per capita	Dollars	1000	1806	93	168	100	135
Growth rate 1/	Percent	3.0		3.0		1.5	
Food production, total 2/	Bil. dols.	72.5	131.8	48.0	92.3	19.8	35.7
Growth rate 1/	Percent	3.0		3.4		3.0	
Food production, per capita 2/	Dollars	80.5	122.0	32.0	39.8	33.0	37.2
Growth rate 1/	Percent	2.1		1.1		.6	
Food consumption, total	Bil. dols.	71.1	95.7	48.8	113.4	20.4	40.2
Growth rate 1/	Percent	1.5		4.3		3.5	
Food consumption, per capita	Dollars	79.0	88.6	32.5	48.9	34.0	41.9
Growth rate 1/	Percent	.6		2.1		1.1	
Income elasticity of demand		.2		.7		.7	
Food surplus	Bil. dols.	1.4	36.1	--	--	--	--
Food aid 3/	Bil. dols.	-1.4		+.8		+.6	
Estimated deficit 4/	Bil. dols.	0	0	2.2	21.1	1.2	4.5
Nutritional deficit	Bil. dols.	0	0	2.2	0	1.2	0

1/ Annual growth rate, percent compounded, 1960-1980.
2/ Food production data for 1960 are net food supplies, i.e., production + (imports - exports), while the data for 1980 are food production less exports. Imports of foods are estimated separately.
3/ The estimated value of food aid in 1960, primarily from the U. S.
4/ The value of the food required to meet the nutritional standards not met by existing food supplies.

Table 4 - Food Deficits - 1980; Estimates Based on Projected Rates of Domestic Food Production and Commercial Imports 1/

Item	Rapidly Developing	Slowly Developing	Total
	(Billion dollars)		
Food Consumption	113.4	40.2	153.6
Food Production (53-60 Rate)	74.2	21.7	95.9
Food Deficit	39.2	18.5	57.7
Food Consumption	113.4	40.2	153.6
Food Production (Projected Rate)	92.3	35.7	128.0
Food Deficit	21.1	4.5	25.6
Increased Commercial Imports, Projected 2/	8.8	2.1	10.9
Remaining Food Deficit	12.3	2.4	14.7

1/ Growth in per capita incomes were assumed to be at the constant rate of 3.0 percent a year for the rapidly developing group but only 2.0 percent for the slowly developing group.

2/ Projections were based on the 1960 level of agricultural imports as reported by GATT, International Trade 1961, GENEVA, Sept. 1962, and the historical elasticity of imports of agricultural commodities as reported in the unpublished research cited in footnote 12.